

DOE OFFICE OF INDIAN ENERGY

# Renewable Energy Project Development: Advanced Concept Topics

An Introduction to Risk, Tribal Roles, and Support Policies in the  
Renewable Energy Project Development Process



# Course Outline

## What we will cover...

- About the DOE Office of Indian Energy Education Initiative
- Concepts and Policies for Understanding Renewable Energy Projects on Tribal Lands
  - Risk and Uncertainty
  - Tribal Project Roles
  - Policies and Incentives
- Additional Information and Resources

# Introduction

The U.S. Department of Energy (DOE) Office of Indian Energy Policy and Programs is responsible for assisting Tribes with energy planning and development, infrastructure, energy costs, and electrification of Indian lands and homes.

As part of this commitment and on behalf of DOE, the Office of Indian Energy is leading **education** and **capacity building** efforts in Indian Country.

# ■ Training Program Objective and Approach

A specially designed curriculum was created to give tribal leaders and professionals background information in renewable energy development to:

- *Present foundational information on strategic energy planning, grid basics, and renewable energy technologies*
- *Break down the components of the project development process on the facility, commercial, and community scale*
- *Explain how the various financing structures can be practical for projects on tribal lands*

# Course Audiences

## Tribal Leaders

- Primary decision makers
- Understand terminology
- Understand key decision points and factors influencing them

## Staff/Project Management

- May be self-managing project or managing consultants
- Communicate at key points with decision makers
- Require in-depth knowledge of process





# How This Advanced/In-Depth Course Fits

## Essentials

Basic process, decisions, and concepts for project development

**Audience:** All involved in project

## Facility

Comprehensive, in-depth process pathways for project development and financing by project scale

**Audience:** Decision makers and project and contract managers

## Advanced/In-Depth

Detailed, academic information for deep understanding of concepts

**Audience:** Project and contract managers

## Community

Comprehensive, in-depth process pathways for project development and financing by project scale

**Audience:** Decision makers and project and contract managers

## Commercial

Comprehensive, in-depth process pathways for project development and financing by project scale

**Audience:** Decision makers and project and contract managers

# ■ About the Speaker

## Travis Lowder

- Renewable energy and financial policy analyst
- Background in international development and environmental governance



# Terminology in These Courses



## Why Is It Important?

- Provides common language for internal discussion
- Assists in interaction with external organizations
- Increases credibility in project development

## What Does It Include?

- Common terms and language for project development
- Acronyms for and roles of:
  - Federal agencies
  - Common federal and state policies



Your resource for reference: DOE-IE Course Terminology Guide





- Risk and Uncertainty
- Roles of the Tribe
- Levelized Cost of Energy (LCOE)
- Tax-Equity Partnership
- The Project Team

**In-depth information on each key concept available in Advanced Courses**



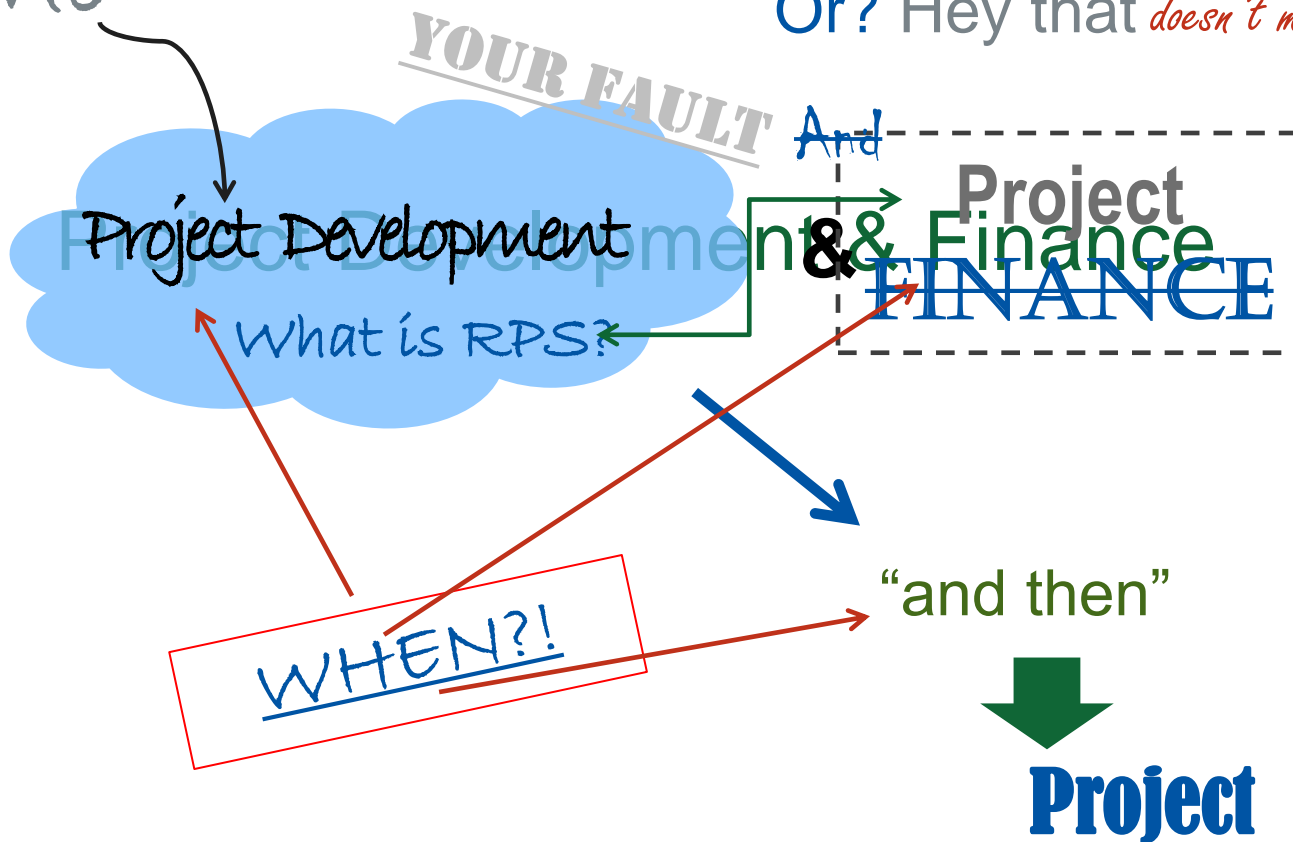
# PROJECT DEVELOPMENT CONCEPTS: RISK AND UNCERTAINTY



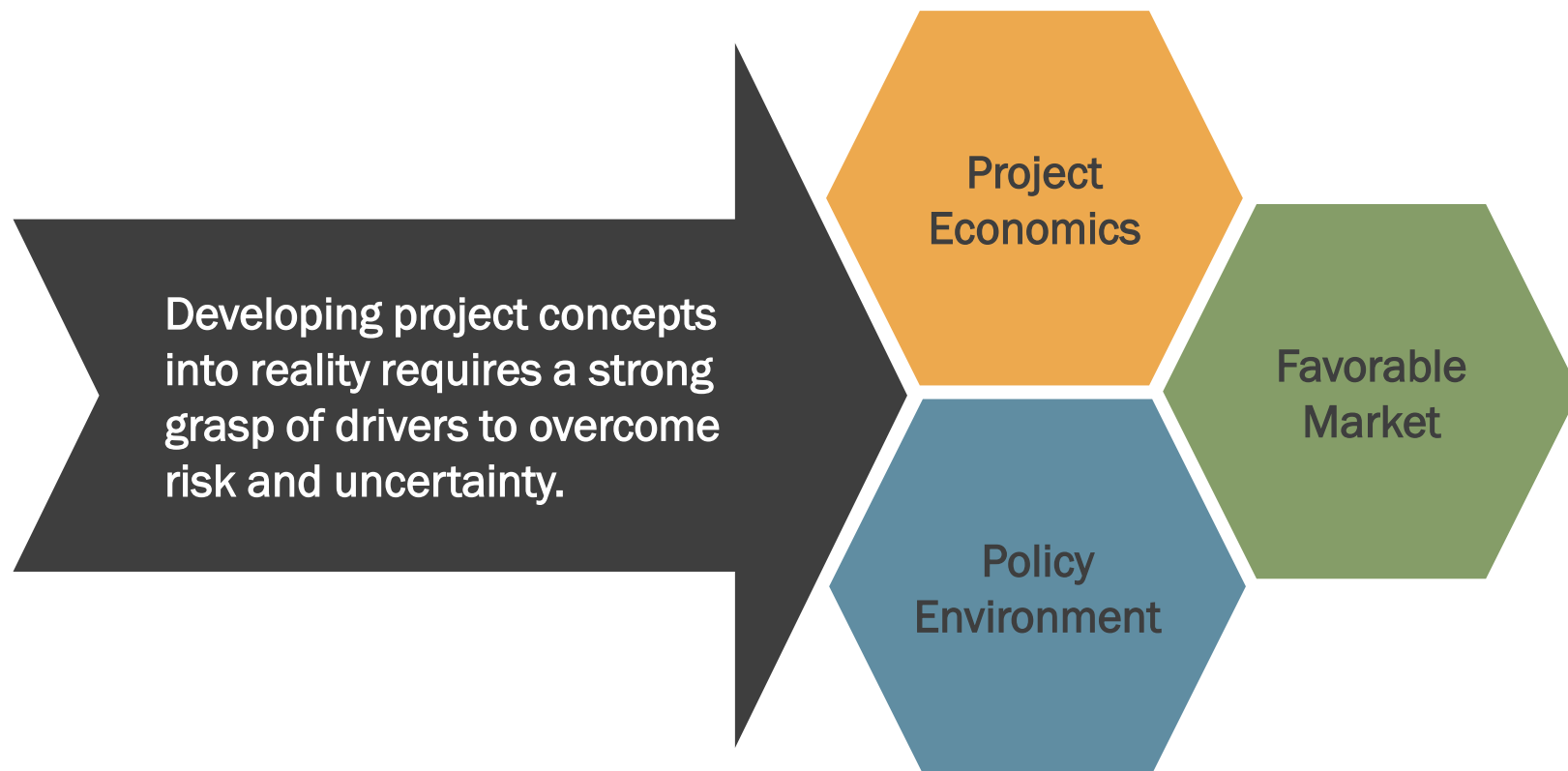
Who?!

Me?

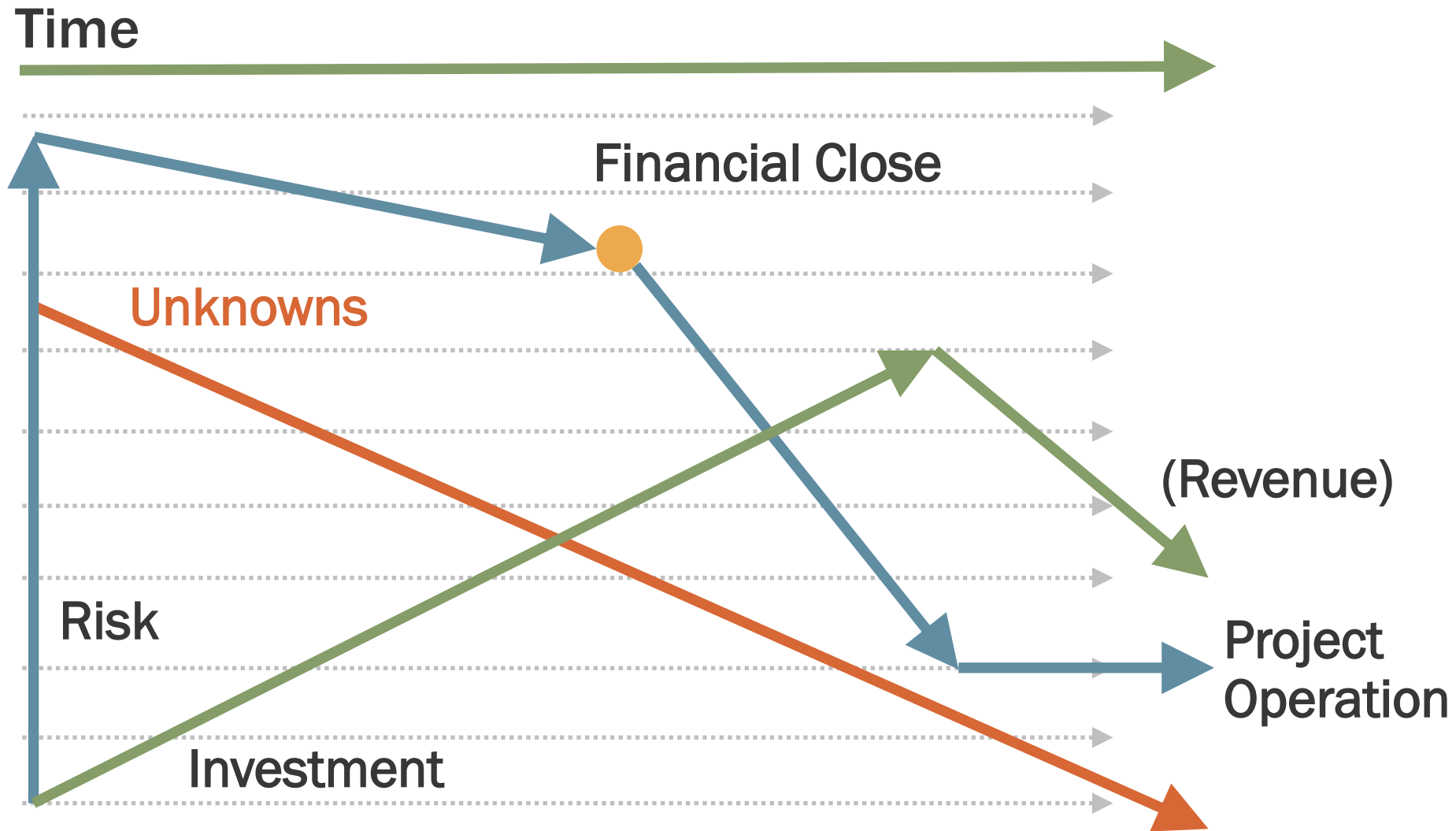
Or? Hey that *doesn't make sense!*



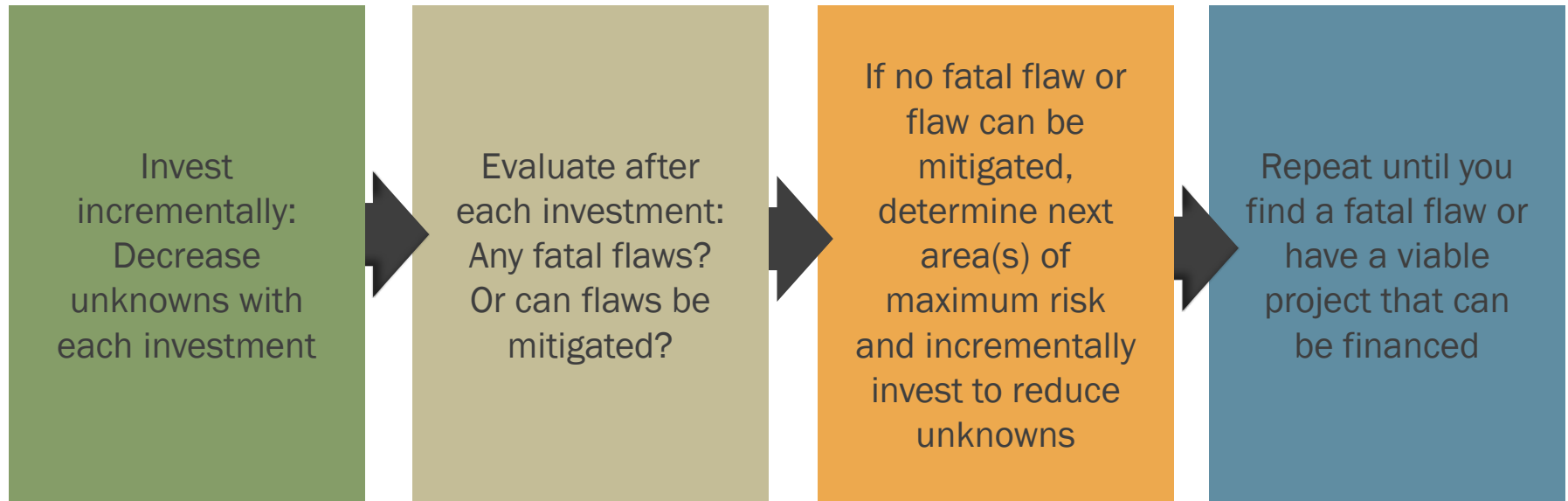
# Risk Reduction and Project Development



# Project Uncertainty/Risk Continuum



# Managing Project Risk



Key to this process is to actively try to find fatal flaws and kill the project as early as possible. The surviving projects should be viable.



# Risk Increases Relative to Project Scale



## FACILITY



**Definition:** Single building system

**Primary purpose:** Offset building energy use

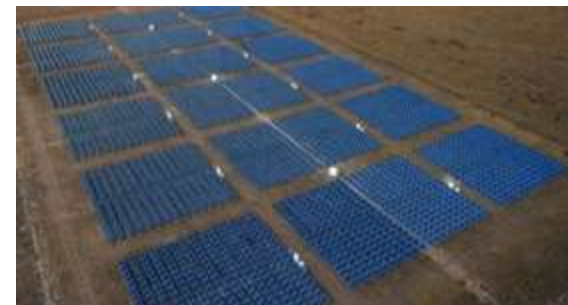
## COMMUNITY



**Definition:** Multiple buildings, campuses

**Primary purpose:** Offset community energy costs, energy self-sufficiency

## COMMERCIAL



**Definition:** Stand-alone project

**Primary purpose:** Revenue generation, financial self-sufficiency

Photo credits: (left to right): NC Solar Center, NREL 09373; Orange County Convention Center, NREL 18077; Tucson Electric Power, NREL 13327

# Key Risks in Project Development



	Risks
Development	<ul style="list-style-type: none"><li>• Concept and scoping</li><li>• Power pricing</li><li>• Access to power markets (adequacy and availability of transmission)</li></ul>
Site	<ul style="list-style-type: none"><li>• Site control</li><li>• Public or community perceptions: NIMBY/BANANA</li></ul>
Permitting	<ul style="list-style-type: none"><li>• Environmental studies</li><li>• Archaeological, historical, cultural significance</li><li>• Federal Aviation Administration restrictions</li></ul>
Finance	<ul style="list-style-type: none"><li>• Capital availability</li><li>• Credit-worthy off-taker</li><li>• Incentive availability risk and regulatory risk</li></ul>
Construction/ Completion	<ul style="list-style-type: none"><li>• Engineering, procurement, and construction difficulties</li><li>• Cost overruns</li><li>• Schedule</li></ul>
Operating	<ul style="list-style-type: none"><li>• Output shortfall</li><li>• Technology operations and maintenance (O&amp;M)</li><li>• Transmission/curtailment</li></ul>

Sources: Adapted from Holland & Hart, RE Project Development & Finance & Infocast, Advanced RE Project Finance & Analysis

# Facility-Scale Project Risk

	Risks
Development	<ul style="list-style-type: none"><li>• Poor or no renewable energy resource assessment</li><li>• Failure to identify all possible costs</li><li>• Unrealistic estimation of all costs</li><li>• Incorrect estimation of long-term facility energy use (energy efficiency first)</li></ul>
Site	<ul style="list-style-type: none"><li>• Structural (e.g., rooftop solar, wind loading)</li><li>• Installation safety (e.g., small wind tower)</li><li>• Site control for safety/security purposes</li></ul>
Permitting	<ul style="list-style-type: none"><li>• Tribally adopted codes and permitting requirements</li><li>• Utility interconnection requirements</li></ul>
Finance	<ul style="list-style-type: none"><li>• Capital availability</li><li>• Incentive availability risk</li></ul>
Construction/ Completion	<ul style="list-style-type: none"><li>• Engineering, procurement, and construction difficulties</li><li>• Cost overruns</li><li>• Schedule</li></ul>
Operating	<ul style="list-style-type: none"><li>• Output shortfall from expected</li><li>• Technology O&amp;M</li></ul>

Sources: Adapted from Holland & Hart, RE Project Development & Finance & Infocast, Advanced RE Project Finance & Analysis

# Community-Scale Project Risk

	Risks
Development	<ul style="list-style-type: none"><li>• Poor or no renewable energy resource assessment</li><li>• Failure to identify all possible costs</li><li>• Unrealistic estimation of all costs</li><li>• Incorrect estimation of long-term “community” energy use (energy efficiency first)</li><li>• Utility rules and ability to offset use with centralized production</li></ul>
Site	<ul style="list-style-type: none"><li>• Structural (e.g., rooftop solar, wind loading, soil conditions)</li><li>• Installation safety (e.g., wind tower, hazard for adjacent sites)</li><li>• Site control for safety/security purposes</li></ul>
Permitting	<ul style="list-style-type: none"><li>• Tribally adopted codes and permitting requirements</li><li>• Utility interconnection requirements</li></ul>
Finance	<ul style="list-style-type: none"><li>• Capital availability</li><li>• Incentive availability risk</li></ul>
Construction/ Completion	<ul style="list-style-type: none"><li>• Engineering, procurement, and construction difficulties</li><li>• Cost overruns</li><li>• Schedule</li></ul>
Operating	<ul style="list-style-type: none"><li>• Output shortfall from expected</li><li>• Technology O&amp;M</li></ul>

Sources: Adapted from Holland & Hart, RE Project Development & Finance & Infocast, Advanced RE Project Finance & Analysis

# Commercial-Scale Project Risk

	Risks
Development	<ul style="list-style-type: none"><li>• Poor or no renewable energy resource assessment</li><li>• Failure to identify all possible costs</li><li>• Unrealistic estimation of all costs</li><li>• Community push-back and competing land use</li></ul>
Site	<ul style="list-style-type: none"><li>• Site access and right-of-way</li><li>• NIMBY/BANANA</li><li>• Transmission constraints/siting new transmission</li></ul>
Permitting	<ul style="list-style-type: none"><li>• Tribally adopted codes and permitting requirements</li><li>• Utility interconnection requirements</li><li>• Interconnection may require new transmission, possible NEPA</li></ul>
Finance	<ul style="list-style-type: none"><li>• Capital availability</li><li>• Incentive availability risk</li><li>• Credit-worthy purchaser of generated energy</li></ul>
Construction/ Completion	<ul style="list-style-type: none"><li>• Engineering, procurement, and construction difficulties</li><li>• Cost overruns</li><li>• Schedule</li></ul>
Operating	<ul style="list-style-type: none"><li>• Output shortfall from expected</li><li>• Technology O&amp;M</li><li>• Maintaining transmission access and possible curtailment</li></ul>





# PROJECT DEVELOPMENT CONCEPTS: TRIBAL PROJECT ROLES



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# Key Concept: Project Role Definitions



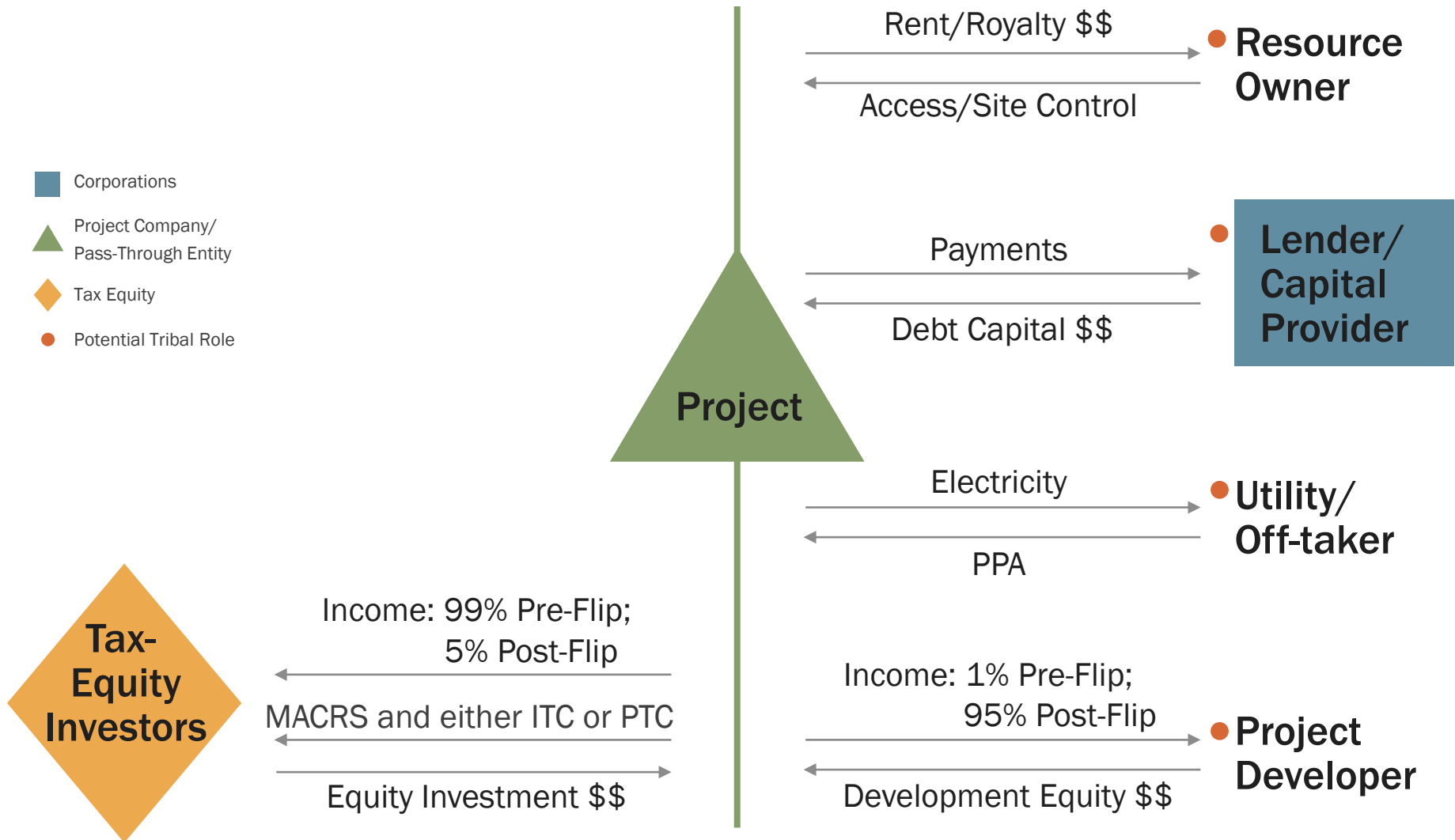
Title	Role
<b>Project Company</b>	Legal entity that owns the project, also called special purpose entity
<b>Resource/Land Owner</b>	Legal and/or beneficial owner of land and natural resources
<b>Sponsor/Developer</b>	Organizes all of the other parties and typically controls project development and makes an equity investment in the company or other entity that owns the project
<b>EPC Contractor</b>	Construction contractor provides design, engineering, and construction of the project
<b>Operator</b>	Provides the day-to-day O&M of the project
<b>Feedstock Supplier</b>	Provides the supply of feedstock (i.e., energy, raw materials) to the project (e.g., for a power plant, the feedstock supplier will supply fuel)
<b>Product Off-taker</b>	Generally enters into a long-term agreement with the project company for the purchase of all the energy
<b>Lender</b>	A single financial institution or a group of financial institutions that provides a loan to the project company to develop and construct the project and that takes a security interest in all of the project assets
<b>Tribal Host</b>	Primary sovereign of project site

# Key Concept: Tribal Role Options



Role	Opportunity	Constraints	Comments
<b>Resource/ Land Owner</b>	Land rent/royalty, taxes. Low risk, known reward, consistent income.	<ul style="list-style-type: none"> <li>Limited project control. Must provide site access.</li> </ul>	Limited upside potential, limited risk
<b>Off-taker/ Energy User</b>	Tribe purchases or uses all power on-site. Could include an “on-site” provider; security.	<ul style="list-style-type: none"> <li>Limited investment, economic development for on-site projects, and capacity-building opportunity</li> </ul>	Must have demand to use power; still requires utility interconnection agreement (if on the grid). Med. risk.
<b>Project Operator/ O&amp;M</b>	Control and self-determination of project; potential for profits (and losses) is minimal	<ul style="list-style-type: none"> <li>Investors require experience</li> <li>Only consider as a new business (multiple projects in a portfolio)</li> <li>Tribes investing money may not want this high risk/return investment</li> </ul>	<ul style="list-style-type: none"> <li>High risk, complex</li> <li>Tribes may be best served by outsourcing</li> <li>A project pipeline/portfolio mitigates some risks</li> </ul>
<b>Lender/ Debt Provider</b>	Participate financially in project (e.g., cash or New Market Tax Credit (NMTC) with lower risk	<ul style="list-style-type: none"> <li>Requires ready capital</li> <li>May be cost-prohibitive to document and manage a single debt transaction (multiple more cost-effective)</li> </ul>	<ul style="list-style-type: none"> <li>Med. risk, more complex</li> <li>Requires lending knowledge</li> <li>Option for Tribes with limited lands, lots of \$</li> </ul>
<b>Equity Investor/ Gen. Owner</b>	Provide cash or NMTC for project development. Less capital than commercial-scale.	<ul style="list-style-type: none"> <li>Higher risk than debt lending. Requires ready capital, or unique source of capital that provides market advantage (like NMTC).</li> </ul>	<ul style="list-style-type: none"> <li>High risk, more complex</li> <li>Competes with other investments</li> <li>Option for Tribes with limited lands, lots of \$</li> </ul>
<b>Project Developer</b>	Self-determination of project; potential for profits (and losses) is moderate. Tribes with \$ don't need investors.	<ul style="list-style-type: none"> <li>Investors require experience</li> <li>Only consider as a new business (do multiple projects for diverse portfolio)</li> <li>Tribes investing money may not want this high risk/return investment</li> </ul>	<ul style="list-style-type: none"> <li>High risk, complex</li> <li>Tribes may be best served by outsourcing</li> <li>A project pipeline/portfolio mitigates some risks</li> </ul>

# Key Concept: Tribal Role Options (cont.)



# Tribal Participation– Resource Owner



## Resource Owner

- Right to “capture” the resource. A project might pay a rent and/or royalty payment to the land owner in exchange for land access (*subject to market conditions*)
- The Tribe may also have the right, and choose to levy taxes on the project, generating tax revenue (*subject to market conditions*)
- This is a low-risk and fairly straightforward method for a tribal entity to participate in a commercial-scale project (*seek experienced legal counsel*)

## Tribal Examples:

- Tribe in the Southwest leases land to a wind project for rent and tax revenue (CA).
- Nevada Tribe considering rent/royalty structure and tax revenue for geothermal project (NV).
- Solar projects under consideration by several Tribes in AZ and NM that can participate in this way.

# Tribal Participation – Lender, Capital Provider



## Lender/Capital Provider

- Lending \$\$ to the project, or other capital such as an NMTC allocation is possible given tribal capacity to do so (*subject to market conditions*)
- Compensation to the Tribe or tribal entity for use of capital provides greater financial exposure—also incurs risk (*risks must be considered and mitigated*)
- This is a medium-risk, more complex method for a tribal entity to participate in a commercial-scale project (*seek experienced legal counsel*)

## Tribal Examples:

- A Tribe in the Northeast is considering using an NMTC allocation to purchase a majority-percentage ownership of project equity
- California Tribe has option to provide equity capital to purchase a minority project interest

# Tribal Participation – Utility/Off-taker



## Utility or Off-taker

- Being a long-term purchaser of a commercial-scale project is likely limited to Tribes with utilities, or a future tribal utility with sufficient demand (*subject to market conditions*)
- Benefits may accrue to the purchaser of energy by fixing supply costs (hedge against rising prices) and increasing energy security (*risks must be considered and mitigated*)
- This is a medium-risk, more complex method for a tribal entity to participate in a commercial-scale project (*seek experienced legal counsel*)

## Tribal Examples:

- An Arizona Tribe has the potential to purchase energy through a tribally owned utility from future solar projects
- Fewer Tribes have electricity demand sufficient to warrant being the off-taker of a commercial-scale project



# Tribal Participation – Developer



## Project Developer

- Developing a commercial-scale project is a specialized, high-risk venture
- Typically, developers mitigate risk through project portfolios (diversification) and use of third-party equity investment (*business risks must be considered and mitigated*)
- This is a high-risk, very complex method for a tribal entity to participate in a commercial-scale project (*seek experienced legal counsel*)

## Tribal Examples:

Few, if any examples exist—and for good reason, considering the risk of entering a commercial-scale project without a development partner. It can be done but must be carefully considered.



# PROJECT DEVELOPMENT CONCEPTS: POLICIES



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# Policy Applicability Depends on a Variety of Factors

Project Scale	Regulations			Incentives		
	Federal	State/ Local	Utility	Federal	State	Utility
<b>Facility</b>		RPS (if applicable)	Interconnection, net energy metering	MARCS & PTC or ITC	Possible incentives available: See Database of State Incentives for Renewables and Efficiency (DSIRE)	
<b>Community</b>	Possible NEPA	RPS	Interconnection, net energy metering (if applicable)	MARCS & PTC or ITC	Possible incentives available: See DSIRE	
<b>Commercial</b>	Possible NEPA	RPS	Interconnection	MARCS & PTC or ITC	Possible incentives available: See DSIRE	

# Federal Regulations

## APPLICABILITY

Federal regulations will typically not apply to **facility-** or **community-**level projects. **Commercial-**level projects may be subject to federal regulations based on project transmission requirements.

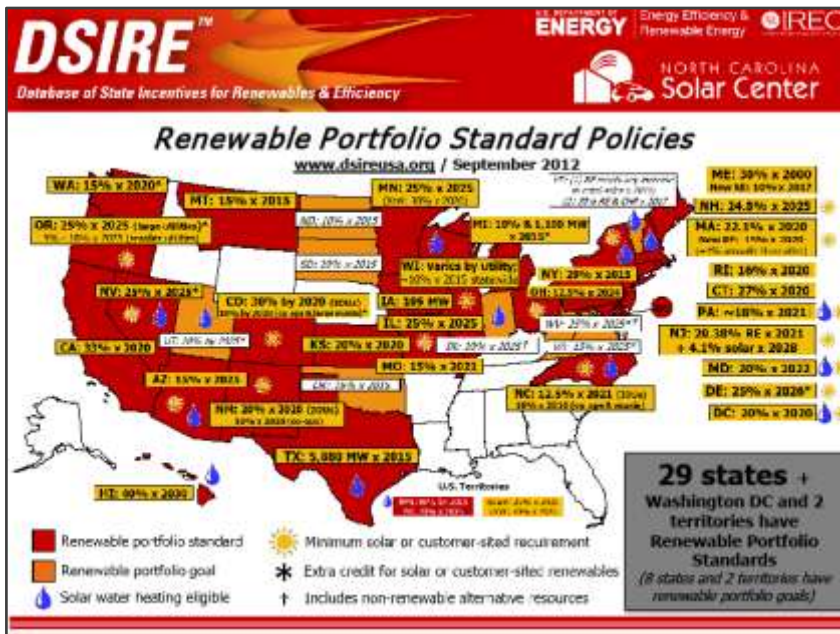
## CONSIDERATIONS

- If new transmission is required and it will cross federal lands, National Environmental Protection Act (NEPA) requirements will be triggered (possibly for whole project)
- Federal Energy Regulatory Commission (FERC) rules and regulations will govern the utility but not a renewable energy project directly

# State/Local Regulations

## State Renewable Portfolio Standard (RPS)

- State mandate to utilities to ensure that a stated minimum % of delivered energy is generated by renewable energy (RE) technologies
- An RPS mandate will help create a market for RE and drive a price premium through the sale of renewable energy certificates (RECs)
- CAUTION: If project depends on RPS and RECs to make economics work, be sure that you have a contract to sell the RECs or are reasonably certain that there will be a market for them



Building codes and standards apply only as each Tribe has adopted them



# Utility Regulations



Rooftop PV installation on the Forest County Potawatomi Tribe administration building. Photo from Forest County Potawatomi Tribe, NREL 20107

## Key to success: involve your utility early in a project

- Get a preliminary utility assessment on project interconnection—any red flags?
- Understand the utility rules regarding interconnection—they may affect project decisions throughout the project process

## Utility will have interconnection procedures

- Interconnection procedures are set by FERC but do not guarantee an interconnection approval
- Scale of the project will determine what type of interconnection study the utility will require (these studies can take time and \$)
- Results of interconnection study could include a utility-estimated cost for necessary equipment and installation to accommodate the interconnection



# Federal Incentives

All federal incentives are presently tax based



Navajo Tribal Utility Authority Wind/PV hybrid system.  
Photo from Sandia National Laboratories, NREL 13331

- Tax incentives are only good if the system owner pays enough federal tax. Partnering with an organization that has tax appetite is a way to monetize tax incentives (more on how to monetize tax incentives in the financing module)
- **Investment Tax Credit (ITC)**: A percentage of the installed system cost (e.g., 30% for solar) can be taken as a tax credit
- **Production Tax Credit (PTC)**: An amount per kWh produced (e.g., \$0.023/kWh for wind) can be taken as a tax credit
- **Modified Accelerated Cost Recovery System (MACRS)**: Allows accelerated depreciation of the RE system cost to reduce taxes

# Sample State and Utility Incentives and Strategies for Assessing the Value of Renewable Energy



The Kumeyaay Wind Power Project, Campo Reservation, California. Photo from Robert Gough, NREL 14793

- **Net-Metering**: Offset meter level use with on-site RE generation. This applies to facility-scale projects.
- **Virtual Net-Metering (VNM)**: Energy production from a larger centralized RE system can be credited multiple meters at other locations. Available in some states with varying rules. Good for community-scale projects.
- **Feed-in-Tariff (FIT)**: Utility will pay for RE energy production based on system characteristic and set tariff rates in enabling legislation.
- **Rebates**: Cash payments based on system characteristics and incentive rules.

These courses were designed in coordination with Tracey LeBeau and Pilar Thomas of the DOE Office of Indian Energy, by a team including: Dan Beckley, Stacy Buchanan, Karlynn Cory, Jason Coughlin, Elizabeth Doris, Mike Elchinger, Sara Farrar-Nagy, Bill Gillies, Travis Lowder, Anirudh Panduru, Paul Schwabe, Bob Springer, Blaise Stoltenberg and Rachel Sullivan of the National Renewable Energy Laboratory; Joe Cruz and Matt Ferguson of Cohn Reznick; Paul Dearhouse of Dearhouse Consulting Group; and Carolyn Stewart of Red Mountain Energy Partners.

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For more information: [www.energy.gov/indianenergy](http://www.energy.gov/indianenergy)

Additional courses: [www.nerlearning.org](http://www.nerlearning.org)

# THANK YOU



# INFORMATION ON THE CURRICULUM PROGRAM AND OFFERINGS

# Curriculum Structure and Offerings

## Foundational Courses

Provide an overview of foundational information on renewable energy technologies, strategic energy planning, and grid basics

## Leadership and Professional Courses

Cover the components of the project development process and existing project financing structures

# Foundational Courses

## Energy Basics

- Assessing Energy Needs and Resources
- Electricity Grid Basics
- Strategic Energy Planning

## Renewable Energy Technology Options

- Biomass
- Building Heat & Hot Water
- Geothermal
- Hydroelectric
- Solar
- Wind

All courses are presented as 40-minute webinars online at: [www.nerlearning.org](http://www.nerlearning.org)

# Leadership and Professional Courses

## Essentials

### Project Development and Financing Essentials

- Key concepts
- Process overview
- Decision points

## Advanced/In-Depth

### Project Development

- Concepts
  - Risk and uncertainty
  - Tribal project roles
  - Policies and renewable energy (federal & state)
- Process
  - Project scale decision factors
  - Understanding the energy market
  - Project team
  - Procurement

### Project Finance

- Concepts
  - LCOE
  - Business structures
  - Tax-equity partnerships
- Process and Structures
  - Direct ownership
  - Flip
  - Leaseback
  - Inverted lease

### Project Scale

- Facility
- Community
- Commercial